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(56) Documents cited
GB 2139151 A GB 2099994 A GB 2061495 A
DE 002907620 A

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(54) **Determining the amount of a fluid or the thickness of a fluid film**

(57) A device for determining the thickness of a dampening-medium fluid film on the surface of a print forme 2 of an offset printing machine, a fluorescent medium 5 of a certain concentration is added to the fluid film and excited using a UV laser to fluoresce on the surface 3 of the print forme 2. The fluorescent radiation 8 is detected and its intensity is used to measure the thickness of the fluid film. The exciting radiation may be modulated.

Fig.1

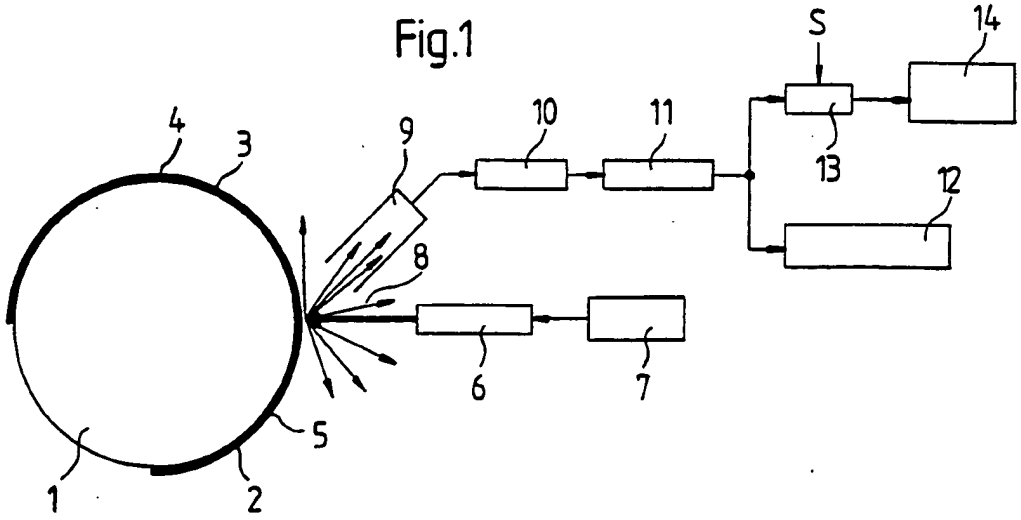

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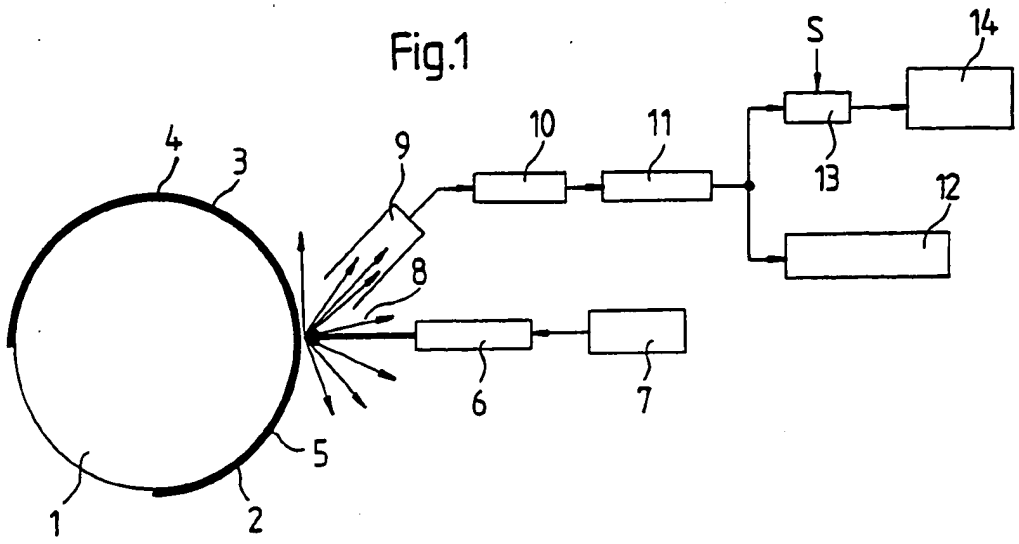
Fig.1



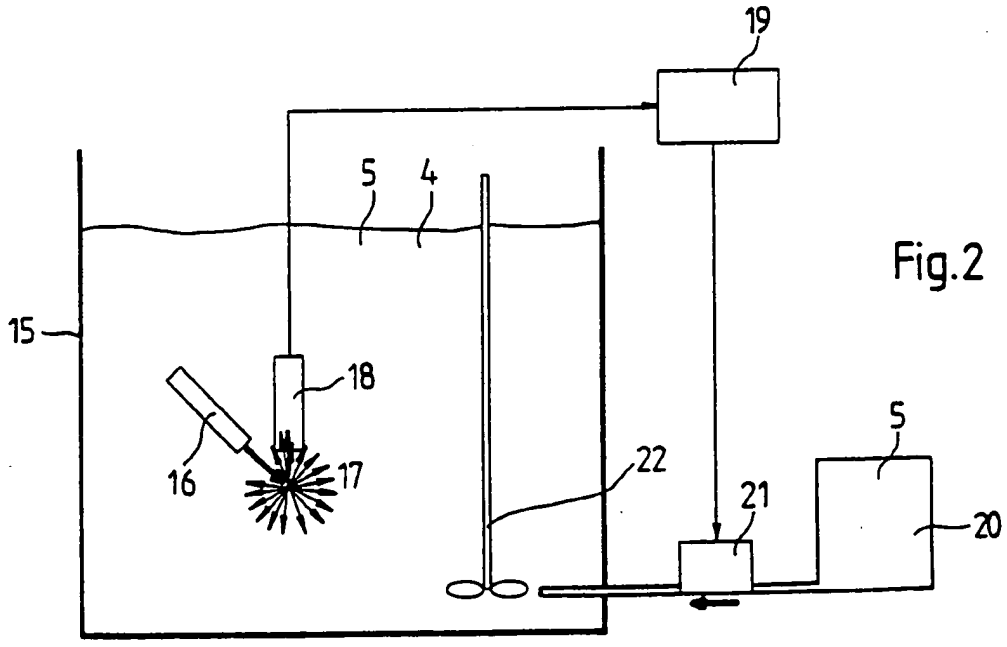


Fig.2

METHOD OF AND DEVICE FOR DETERMINING THE AMOUNT OF A FLUID OR THE THICKNESS OF A FLUID FILM

The invention relates to a method of determining the amount or the thickness of a fluid film, particularly the thickness of the dampening-medium film on the surface of a print forme of a printing machine, particularly an offset printing machine.

In order to achieve a good print quality it is necessary to supply the surface of the print forme of a printing machine with a certain amount of dampening-medium. The amount of the dampening-medium supplied forms a certain thickness of the dampening-medium film. If this thickness of the dampening-medium film which depends on various parameters, e.g. the temperature, the printing speed, the type of the print forme etc. and which is provided on the surface of the print forme is determined, it may be compared with a set value and adjusted accordingly, if necessary.

Known are methods which use changes in the radiation reflected from a moistened roller or printing plate to determine the thickness of the dampening-medium film. As the radiation is also influenced by e.g. the nature of the surface of the measuring location, such measuring methods do, however, not produce a result which is exclusively specific for the dampening medium.

It is the object of the invention to provide a method of determining the amount or the thickness of a fluid film, particularly the thickness of a dampening-medium film on the surface of a print forme, a method which permits the determination of a precise measuring result with simple means.

According to the invention this object is achieved in that a fluorescent medium of a certain concentration which is excited to fluoresce on the surface of a print forme is added to the fluid, that the fluorescent radiation is detected and its intensity used a measure for for the amount or the thickness of the fluid film. Thus, according to the invention the fact that a fluorescent medium or a fluorescent dye is used to determine the amount or the thickness of the dampening-medium film on the surface of the print forme. The fluorescent radiation produced by a radiation source represents a measure for the amount or the thickness of the dampening-medium film. It is of great importance that the dampening medium always contains a certain constant concentration of the fluorescent medium in order to establish only one dependence of the intensity of the fluorescent radiation on the amount of the dampening medium or the thickness of the dampening-medium film.

According to a further development of the invention a radiation source pulsed with a constant frequency is used to produce the fluorescence. Due to the fact that the fluorescent-radiation detector registers only radiation intensities having said pulse frequency, the disturbing influence of the ambient light is eliminated to a great extent (chopper principle).

Preferably a fluorescent medium is selected which, when not being excitated by a radiation source which produces the fluorescent radiation, is achromatic in the visible wavelength range. Thus, it is avoided that the fluorescent medium affects the printing process that means that it is not possible to use e.g. an inky substance. The wavelength of the fluorescent radiation may be selected arbitrarily.

According to a further development of the invention the concentration of the fluorescent medium contained in the fluid is very weak. It has been found out that weak concentrations

suffice to produce a relatively intense fluorescent radiation in the dampening medium.

The wavelength of the fluorescent light or the fluorescent radiation is not restricted to a certain value. Preferably, the entire range from infrared to ultraviolet may be used.

Moreover, the invention relates to a device for determining the amount of the fluid or the thickness of the fluid film, particularly the thickness of the dampening-medium film on the surface of a print forme of a printing machine, particularly an offset printing machine, a radiation source being provided which irradates the fluid to which a fluorescent medium of a certain concentration has been added and which is provided on the surface of the print forme, said device comprising a sensor to detect the intensity of the fluorescent radiation and an evaluation device to determine the amount of the fluid or the thickness of the fluid film on the basis of said intensity.

In particular, the radiation source is a narrow-band ultraviolet lamp of low power, e.g. preferably a laser diode.

According to a further specimen embodiment of the invention the radiation source is connected to a modulator for the purpose of pulsing. This makes it possible to eliminate environmental radiation that means that the measuring result is not falsified.

The sensor which detects the fluorescent radiation may preferably be designed as an electronic, photoelectronic component, preferalby as a photodiode or phototransistor.

Preferably the relatively weak signal produced by the sensor is intensified by an intensifier and then supplied to a frequency filter through which only signals having modulator frequency may pass. Thus, environmental radiation has no detrimental effects.

Preferably an automatic metering device is provided to ensure that the fluorescent medium added to the dampening-medium has always the desired constant concentration. Particularly for this purpose a further radiation source and a further sensor are provided in the dampening-medium fountain of the printing machine, the intensity of the fluorescent radiation produced by the radiation source being determined by the further sensor and being compared with a set value. When falling below the set value the metering device adds an adequate amount of the fluorescent medium to the dampening-medium in the dampening-medium fountain that the determined actual value corresponds to the set value.

To counteract local concentration fluctuations the dampening-medium fountain is provided with a stirring device. Said stirring device always ensures a uniform distribution of the fluorescent medium in the fluid.

The drawings illustrate the invention with reference to the specimen embodiment.

Fig. 1 shows a device for determining the amount of dampening medium on the surface of a print forme, and

Fig. 2 shows an automatic metering device for metering the fluorescent medium.

Fig. 1 shows a plate cylinder 1 of an offset printing machine (not illustrated). A print forme 2 which is designed as a printing plate is mounted on the plate cylinder 1. On the surface 3 of said print forme 2 there is provided a dampening medium 4 necessary for the printing process. This dampening medium consists mainly of water and certain known additives, e.g. alcohol or the like. As the thickness of the dampening-medium film is very slight, it cannot be seen in Fig. 1.

According to the invention a fluorescent medium 5 having a certain weak concentration is added to the dampening medium 4.

A radiation source 6 which is designed e.g. as a narrow-band ultraviolet lamp of low power, in particular a laser diode, is provided opposite the surface 3 of the print forme 2. Said radiation source 6 is connected to a modulator 7 so that its radiation is projected onto te surface 3 of the print forme 2 which is modulated or pulsed accordingly. Due to this radiation the fluorescent medium 5 contained in the dampening medium 4 is excited to produce a fluorescent radiation. 8 A sensor 9 detects a constant solid angle of the fluorescent radiation 8 and forms an appropriate signal which depends on the intensity of the fluorescent radiation 8 and thus represents a measure for the amount of the dampening-medium or the thickness of the dampening-medium film on the surface 3 of the print forme 2. Said signal is fed to an intensifier 10 from where it is supplied to a frequency filter 11 through which only signals having modulator frequency may pass. The result that is the dampening-medium amount or the thickness of the dampening-medium film may be shown on a display 12. Furthermore, the result is fed to a controller 13 which also receives a set value S of the dampening-medium amount. On the basis of the adjusted difference the controller 13 forms a signal which actuates an adjusting member 14 which drives the dampening unit of the printing machine such that the dampening-medium amount or the thickness of the dampening-medium film on the surface of the print forme 2 is influenced according to the adjusted difference.

Fig. 2 shows an automatic metering device which ensures a constant concentration of the fluorescent medium 5 contained in the dampening medium 4. For this purpose the dampening-medium fountain 15 of the above-mentioned offset printing machine is provided with a further radiation source 16 which irradates the dampening medium 4 to which a fluorescent medium has been added

and produces a respective fluorescent radiation 17. The intensity of said fluorescent radiation is determined by a further sensor 18, the determined value being fed as an actual value to a controller 19. As a set value said controller 19 receives a preset concentration value and feeds a signal to a metering pump 21 when the preset concentration of the fluorescent medium is below said value, so that an adequate amount of fluorescent medium 5 is supplied from a fluorescence-medium fountain 20 into the dampening-medium fountain 15. The stirring device guarantees that there is a uniform concentration all over the dampening-medium fountain 15. Thereafter the dampening medium 4 having a preset constant concentration of fluorescent medium is taken from the dampening-medium fountain 15 and applied onto the surface 3 of the print forme 2.

The supply of the fluorescent medium is preferably controlled in order to ensure that the concentration of the fluorescent medium has always the same preset value, which is neither too high nor too low.

It will be appreciated that the foregoing has been described by way of example only and that changes may be made without departing from the scope of the invention.

CLAIMS

1. A method of determining the amount of a fluid or the thickness of a fluid film on a surface in which a fluorescent medium of a certain concentration is added to said fluid and is excited to fluoresce on the surface, the fluorescent radiation is detected and its intensity is used as a measure for the amount of the fluid or the thickness of the fluid film.

2. A method according to claim 1 in which the thickness of the fluid film is the thickness of the dampening-medium film on the surface of a print forme of a printing machine.

3. A method according to claim 2 in which the printing machine is an offset printing machine.

4. A method according to any one of the preceding claims, in which a pulsed radiation source is used to produce the fluorescence.

5. A method according to any one of the preceding claims, in which the fluorescent medium is selected such that, when not being excited by a radiation source producing the fluorescent radiation, it is achromatic in the visible wavelength range.

6. A method according to any one of the preceding claims, in which the concentration of the fluorescent medium contained in the fluid is very weak.

7. A method according to any one of the preceding claims, in which the wavelength of the fluorescent radiation is in the range extending from infrared to ultraviolet.

8. A device for determining the amount of a fluid or the thickness of a fluid film on a surface comprising:

a radiation source which irradiates the fluid on the surface and contains a fluorescent medium of a certain

concentration, a sensor which detects the intensity of the fluorescent radiation and an evaluation device which determines the amount of the fluid or the thickness of the fluid film on the basis of said radiation intensity.

9. A device according to claim 8, in which the thickness of the fluid film is the thickness of the dampening-medium film on the surface of a print forme of a printing machine.

10. A device according to claim 9, in which the printing machine is an offset printing machine.

11. A device according to any one of claims 8 to 10, in which the radiation source is a narrow-band ultraviolet lamp of low power.

12. A device according to any one of claims 8 to 11, in which the radiation source is a laser diode.

13. A device according to any one of claims 8 to 12, in which the radiation source is connected to a modulator for pulsed operation.

14. A device according to any one of claims 8 to 13, in which the sensor is an electronic, photoelectronic component.

15. A device according to claim 14 in which the sensor is a photodiode or a phototransistor.

16. A device according to any one of claims 8 to 15, in which the signal produced by the sensor is fed to an intensifier.

17. A device according to any one of claims 8 to 16, in which the signal produced by the sensor is supplied to a frequency filter through which only signals having modulator frequency may pass.

18. A device according to any one of claims 8 to 17, in which the fluorescent medium is added to the fluid by means of an automatic metering device.

19. A device according to any one of claims 8 to 18, comprising a further radiation source and a further sensor in a dampening-medium fountain, the intensity of the fluorescent radiation produced by the further radiation source being determined by the further sensor and being compared with a set concentration value, that, when falling below said set value, an adequate amount of fluorescent medium is added to the dampening medium contained in the dampening-medium fountain by means of the metering device so that the determined actual value corresponds to the set value.

20. A device according to any one of claims 8 to 19, in which a stirring device is provided in the dampening-medium fountain.

21. A device according to any one of claims 8 to 20 for applying said method according to any one of claims 1 to 7.

22. A device substantially as described with reference to figure 1 or to figure 2 of the drawings.

23. A method substantially as described with reference to figure 1 or to figure 2 of the drawings.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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(ii) Int CL (Edition 5) G01B, G01N

Search Examiner
J M MCCANN

Databases (see over)

(i) UK Patent Office

(ii) ONLINE WPI

Date of Search
7 JULY 1992

Documents considered relevant following a search in respect of claims 1 AND 8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2139151 A (AT & T) see page 1 lines 61 to page 2 line 7	1,7,8,21
X	GB 2099994 A (E G OSAKEYHTIÖ) Figure 1, page 1 lines 16 to 23	1,7,8,21
X	GB 2061495 A (UKAEA) page 1, lines 6 to 15	1,8,21
X	DE 2907620 (FRAUNHOFER-GES FORD ANGE) Abstract and figure 1	1,7,8,21

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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